

Dan Wittliff
Exhibit 2.3.2 – December 2018 Site Visit - Buck

Wednesday 12/5

Buck

Duke staff: Tim Hill, Elizabeth Green, Scott Harris, John Kwon

GDS staff: Dan Wittliff, Megan Morello

SC ORS staff: Michael Seaman-Huynh

1. How many and how big are the units are on the site, when were they commissioned, and when did they or will they cease operations? **The coal plant was retired April 1st 2013. Units 1 and 2 were built in 1926, Units 3 and 4 were built in the early 1940's, Units 5 and 6 were built in the 1950's, and 3 CTs were added in the 1970's as peakers. All now gone, and a combined cycle unit operates in its place.**
2. How many CCR impoundments and landfills are on site, when were they built, and when were they decommissioned or closed? What is their capacity and how much is currently in place? **There are 3 basins, 1 ash stack (inside the 1st Basin). No landfills.**
3. Please describe how ash and sludge are conveyed to the impoundments or landfills.
4. Were landfills lined with a Subtitle D compliant liner when they were built? Please describe the liners currently in place on plant landfills where CCR is stored or disposed of? How far above the uppermost aquifer is the bottom of the liner? **The Primary Basin is from 1950, unlined. Main dam built to separate it out. Secondary Basin added for additional capacity, from the intermediate dike of the primary basin.**
5. Were CCR surface impoundments (ponds) lined when they were built? Have they been lined since? Please describe the liners currently in place on plant surface impoundments where CCR is stored or disposed of? How far above the uppermost aquifer is the bottom of the liner?
6. Please describe any issues that have occurred with seeps, leaks, or slope erosion on surface impoundments. What has been done to control, eliminate, or otherwise mitigate these issues? Were these seeps or leaks permitted under the NPDES program administered by the state? When were these permits issued? Are there any issues with discharge parameters that need treatment such as pH control? Please describe. **The NPDES October 2018 permit (effective Nov 1st) – prior permit expired in 2016, renewal application was sent in 2014. Covers outfalls 111 and 117. The SOC covers non-engineered seeps, 8 are sampling, some are dispositioned. Onsite drinking water well has had some excursions, but not used for drinking, used for process water. Sampling regularly. Dispositioned: presented info to DEQ, agree no constituents of concern, and/or repaired, so now flow or no need to monitor. Seep 116 was a low part of ground and filled with rainwater, filled up with dirt so it doesn't fill up. Seep 112 was from a manhole pipe which has been filled. There is pH treatment via caustic and sulfuric acid. Grab samples, some weekly, most monthly.**
7. Please describe the closure plan and its associated schedule that have been submitted to the state environmental agency for each landfill or impoundment. What factors drove the choice of closure plan options? Please describe the costs associated with the closure plan for the closure

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action chosen and any other alternative closure options that were considered. **Excavation: ash beneficially reused in STAR unit. Basin 1 first, several years, then Basin 2, then Basin 3. Must be done by 2029 per CAMA. Closure plan is not yet submitted – some time in 2019. Will use class F fly ash for concrete. Will decant free water to 3 feet above ash, then dewater. Start in March, have one year to finish. Beneficiation will involve at least 300,000 tons per year. Beneficiation unit must be operational 2 years from permit date. Low risk classification per CAMA.**

8. What issues to ground water drinking supplies have been caused by the seeps and leaks from the surface impoundments or landfills? What has been to address these issues? **Some new water lines were run to neighbors and some new systems were installed.**
9. Please describe the process where CCR is generated, conveyed, stored/disposed, or reused? Include the fraction of the CCR that is bottom ash, fly ash, economizer ash, and scrubber sludge and how much of each is stored/disposed or sold or beneficially reused. Where beneficiation exists or is contemplated for a site, please describe the following: (a) the process itself, (b) the rationale for choosing this technology, (c) the rationale for choosing this site, (d) the schedule of completing this project, and (e) the costs/performance associated with project.

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Exhibit 2.4.1 – January 2018 Site Visit – Cliffside**NOTES ON DEC PLANT VISITS – Cliffside****JANUARY 8-10, 2018**

Cliffside – In afternoon of January 10, 2018, received safety briefing and participated in overview discussion of Units 1-4 Inactive, Unit 5 Inactive, and new Active Ash Basins as part of the CCR Rule requirement to convert to dry ash handling in order to maintain an operating unit. Unit 6 and Unit 5 are dual fuel capable. Unit 6 can burn up to 100 percent natural gas while Unit 5 can go up to 10 percent natural gas while Unit 6 is burning 100 percent natural gas. Suck Creek is a flowing creek that winds its way along the western edge of the Active Ash Basin. Suck Creek flows into the Broad River which flows along the northern boundary of the power plant property.

a. Ash Basins – The Units 1-4 Inactive Ash Basin is being repurposed to hold two wastewater treatment and retention ponds as well as a wastewater treatment plant as part of the switch to dry fly ash handling. The ash was removed and the impoundment cleaned using the same methodology as employed at Riverbend. The Unit 5 Inactive Ash Basin has some ash and is covered with a soil cap. To prevent overtopping of the dam during the PMP rain event, the Company created a concrete-capped spillway and hardened drainage way on the north end of the dam near the existing drop structure. The Active Ash Basin still receives some plant waste streams including contact storm water from industrial processes while the plan conversion and rerouting of these streams is in progress.

b. Unit Environmental Controls – Unit 6 is the newest unit built in 2012. It is a supercritical sliding pressure unit equipped with an SCR (NOx controls), Dry Scrubber (deals with acid mist, SO₃, and, HFI), Baghouse (deals with particulate), and Wet Scrubber (deals with SO₂). Unit 6 uses dry fly and bottom ash handling, but the dry absorber spray and high LOI renders the fly ash unsuitable for use as a concrete add mixture (i.e., won't harden). The gypsum from the scrubbers is sold to agriculture, wall board, and some to concrete operations. Unit 5 converted to dry fly ash handling in October 2017 and plans to complete the conversion to dry bottom ash by May 2018. The dry handling includes a dragline (conveyor??) to remove bottom ash.

c. Environmental Compliance – The stated performance goal for Cliffside as well as other DEC plants is zero non-compliance with NPDES permits.

d. Landfills – The landfill for the plant is in the southwest corner of the plant property and has a maximum of five cells with Cells 1 and 2 already built. It receives dry bottom ash, dry fly ash, and off spec FGD gypsum cake.

e. Seeps – The plant has identified 36 different seeps of various sizes and controls. Twenty two of these seeps were part of the 2014 NPDES filing. The bulk of these seeps are non-engineered and frequently they don't flow enough to get a reliable sample. Richard Baker, environmental, indicated a company methodology for taking a longitudinally split piece of PVC pipe across the channel to create a weir so that enough depth can be created to get a reliable sample of the flow. The engineered seeps will be included as specific outfalls in the new NPDES permit while the others will be addressed in a special order of consent. All seeps will be evaluated separately to determine the corrective or closure action.

f. Dam Safety – To prevent Unit 5 Inactive Basin from overtopping during the PMP, the company created an emergency spillway on the northeastern corner of the dam near the current drop structure.

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Exhibit 2.4.2 – December 2018 Site Visit - Cliffside

Tuesday 12/4

Cliffside/Rogers

Duke staff: Tim Hill, Robert Wylie, Scott Saunders, Scott Martin

GDS staff: Dan Wittliff, Megan Morello

SC ORS staff: Anthony Sandonato

1. How many and how big are the units are on the site, when were they commissioned, and when did they or will they cease operations? **Units 1, 2, 3, and 4 stopped running in 2011 and are demolished. Units 5 and 6 still burn coal, co-firing work is underway.**
2. How many CCR impoundments and landfills are on site, when were they built, and when were they decommissioned or closed? What is their capacity and how much is currently in place? **Units 1-4 Basin (inactive), Inactive Ash Basin (unit 5), Active Ash Basin (unit 6). None lined.**
3. Please describe how ash and sludge are conveyed to the impoundments or landfills. **All dry ash handling. Previously was wet sluiced prior to conversion. Dry bottom ash conversion for unit 5 is complete, so now both units bottom ash is dry handled.**
4. Were landfills lined with a Subtitle D compliant liner when they were built? Please describe the liners currently in place on plant landfills where CCR is stored or disposed of? How far above the uppermost aquifer is the bottom of the liner? **Industrial Landfill – unlined, 2 phases. 1st phase is primarily fly ash and bottom ash, with gypsum on top. 1st phase received ash from Asheville and the Units 1-4 basin. 2nd phase primarily fly and bottom ash.**
5. Were CCR surface impoundments (ponds) lined when they were built? Have they been lined since? Please describe the liners currently in place on plant surface impoundments where CCR is stored or disposed of? How far above the uppermost aquifer is the bottom of the liner? **Unlined when built. Units 1-4 ash basin has been excavated and cleaned. Currently building a lined holding basin in its footprint and a water treatment facility.**
6. Please describe any issues that have occurred with seeps, leaks, or slope erosion on surface impoundments. What has been done to control, eliminate, or otherwise mitigate these issues? Were these seeps or leaks permitted under the NPDES program administered by the state? When were these permits issued? Are there any issues with discharge parameters that need treatment such as pH control? Please describe. **Some of the Units 1-4 basin seeps have dried out. Haven't started decanting the other basins yet so those seeps are still active. NPDES permit has 2 constructed seeps. All other seeps are dealt with by the SOC. On schedule to meet SOC timelines. Decanting needs to be done by March 2020, starting in January 2019 (expected to take one year). Historical data has all been in compliance with pH requirements so there is not currently any pH control in place. SW009 is a stormwater outlet. AOW S-2 is an SOC sample point.**
7. Please describe the closure plan and its associated schedule that have been submitted to the state environmental agency for each landfill or impoundment. What factors drove the choice of closure plan options? Please describe the costs associated with the closure plan for the closure

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Exhibit 2.4.2 – December 2018 Site Visit - Cliffside

action chosen and any other alternative closure options that were considered. **Closure is driven by CAMA. Classified as Low Risk – 2019 deadline for plans for cap in place. Unit 5 Basin – cap in place. Decant, dewater, then regrade ash into a dome, cover with synthetic HDPE liner and 24" of soil on top. Water directed to v-notch in dam. Final plans still working – will submit to DEQ in August 2019. Constructing decanting pad now. Continuously monitored for TSS and pH. Monthly DMR sampling for constituents in NPDES, moves to weekly sampling as you get into interstitial water. CAMA started the closure plans, pending state plans approval. Rationale for synthetic liner vs. clay was low availability of clay making it more costly. The Units 1-4 ash basin has been excavated and cleaned. Currently building a lined holding basin in its footprint and a water treatment facility. Water treatment plant is almost done (expected in January). Has two 1 million gallon equalizer tanks. Licensed by the state. The Inactive Ash Basin already has a soil cover, but it is not truly capped yet.**

8. What issues to ground water drinking supplies have been caused by the seeps and leaks from the surface impoundments or landfills? What has been to address these issues? **No issues known.**
9. Please describe the process where CCR is generated, conveyed, stored/disposed, or reused? Include the fraction of the CCR that is bottom ash, fly ash, economizer ash, and scrubber sludge and how much of each is stored/disposed or sold or beneficially reused. Where beneficiation exists or is contemplated for a site, please describe the following: (a) the process itself, (b) the rationale for choosing this technology, (c) the rationale for choosing this site, (d) the schedule of completing this project, and (e) the costs/performance associated with project. **All dry ash handling. Previously was wet sluiced prior to conversion. Dry bottom ash conversion for unit 5 is complete, so now both units bottom ash is dry handled.**

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Exhibit 2.5.1 – December 2018 Site Visit – Dan River

Friday 12/7

Dan River

Duke staff: Issa Zarzar, Jeff Gateley, Joyce Dishmon, Henry Taylor, Michael Lang

GDS staff: Dan Wittliff, Megan Morello

SC ORS staff: none

1. How many and how big are the units are on the site, when were they commissioned, and when did they or will they cease operations? **There is one 2x1 combined cycle unit onsite, 650 MW capacity. The original coal units are fully demolished.**
2. How many CCR impoundments and landfills are on site, when were they built, and when were they decommissioned or closed? What is their capacity and how much is currently in place? **There is a Primary and Secondary Ash Basin, plus two ash stacks. Ash stack 1 was excavated (hauled offsite), then filled in above the water shed, and then the landfill was built. Everything in the basins is being excavated to an onsite landfill.**
3. Please describe how ash and sludge are conveyed to the impoundments or landfills.
4. Were landfills lined with a Subtitle D compliant liner when they were built? Please describe the liners currently in place on plant landfills where CCR is stored or disposed of? How far above the uppermost aquifer is the bottom of the liner? **The landfill was opened in 2017 (construction began in 2014-15). It is double lined with leachate collection and leak detection.**
5. Were CCR surface impoundments (ponds) lined when they were built? Have they been lined since? Please describe the liners currently in place on plant surface impoundments where CCR is stored or disposed of? How far above the uppermost aquifer is the bottom of the liner? **Unlined. Ash basins were built in several stages and enlarged many times – last expansion was in the 80s.**
6. Please describe any issues that have occurred with seeps, leaks, or slope erosion on surface impoundments. What has been done to control, eliminate, or otherwise mitigate these issues? Were these seeps or leaks permitted under the NPDES program administered by the state? When were these permits issued? Are there any issues with discharge parameters that need treatment such as pH control? Please describe. **The December 1st 2016 NPDES permit had 3 non-constructed seeps, one never flowed, one had flow but is now intermittent now that decanting is done, and one has always been intermittent. No SOC is in place. Ash basins are almost fully decanted now, mostly just rainwater in there. The staff could not think of any active seeps.**
7. Please describe the closure plan and its associated schedule that have been submitted to the state environmental agency for each landfill or impoundment. What factors drove the choice of closure plan options? Please describe the costs associated with the closure plan for the closure action chosen and any other alternative closure options that were considered. **CAMA escalated the timeline here. The closure plan involves excavating ash to onsite landfill (CAMA deadline Aug 1st 2019), standard landfill design, 3:1 slope, approved for standard liner and soil cap.**

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Exhibit 2.5.1 – December 2018 Site Visit – Dan River

Duke is considering an artificial closure turf/liner system (like Sutton), needs DEQ analysis and approval. Doing cost-benefit analysis now. They have had to do a lot of ash drying because of hurricane rain in 2018. They are currently filing for vertical expansion for the landfill. The landfill uses tack-on berms instead of traditional benches, to allow for maximum capacity in the landfill. One “bench” is the road.

8. What issues to ground water drinking supplies have been caused by the seeps and leaks from the surface impoundments or landfills? What has been to address these issues? **Contact stormwater has 2 outputs – 1 to city of Eden, one to NPDES outfall after being treated onsite**
9. Please describe the process where CCR is generated, conveyed, stored/disposed, or reused? Include the fraction of the CCR that is bottom ash, fly ash, economizer ash, and scrubber sludge and how much of each is stored/disposed or sold or beneficially reused. Where beneficiation exists or is contemplated for a site, please describe the following: (a) the process itself, (b) the rationale for choosing this technology, (c) the rationale for choosing this site, (d) the schedule of completing this project, and (e) the costs/performance associated with project. **Closure driven by CAMA.**

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Exhibit 2.6.1 – January 2018 Site Visit - Marshall

NOTES ON DEC PLANT VISITS – Marshall

JANUARY 8-10, 2018

Marshall – On the morning of January 9, 2018, received safety briefing and participated in overview discussion of issues on Ash Basin and Seven Landfills (Closed Ash Landfill (wooded), Closed Ash Landfill, Asbestos Landfill, Active Industrial Landfill, Structural Fill, and FGD Residue Landfill), ground water monitoring, city water supplies, NPDES permitting issues, and closure plan. Like Belews Creek, Marshall will continue operation as an active four-unit (2,000 MW) coal-fired power station.

a. Ash Handling – The fly ash is handled dry and, while the bottom ash is currently sluiced wet to the Ash Basin. The Ash Basin covers 400 acres, 150 acres wet. A project is underway to build a set of lined retention basins to remove this water from the ash basin (as the dry bottom ash handling system is implemented) and process the wastewater through the lined impoundments and a reroute of the process wastewater line similar to what is being done at Belews Creek. Observed active flow of fly ash area sump water into Ash Basin.

b. Landfills – Of the seven landfills on site, only one is active (i.e., Active Industrial Landfill) and intends to close the FGD landfill. The FGD landfill has a single composite liner while the Active Industrial Landfill has a double liner of soil GCL and two geomembranes. (Verify)

c. Closure Project – The Company estimates that it will begin decanting the active ash in late 2019 but the CAMA suspense will depend some on the on the priority ranking which DEC expects to be low now that the dam safety assessment and rip rap improvements have been made and there are no drinking water issues.

d. Seeps – Went to three seeps (not engineered) and areas of wetness to review the flows and visible clarity of the water. Observed seep numbers now identified as Outfalls 101 and 102 under NPDES Permit NC0004987. To treat potential low pH from the seeps, the Company installed screened boxes with limestone in the bottoms in the middle of the drain way. Observed AOW S-17. Reviewed active flow of Ash Silo contact storm water into the Ash Basin.

e. Drop Structures – Observed new Ash Basin discharge structure in northeast corner of the Ash Basin near the new emergency spillway. Observed flows from Ash Basin Outfall 002. Discharges enter the intake channel from which the plant draws cooling water so the impacts of the discharge into the channel are rapidly mixed.

f. Dam Safety – Walked the impoundment dam between the Ash Basin and Lake Norman. Examined rip rap and condition of concrete drain swales.

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Exhibit 2.6.2 – December 2018 Site Visit - Marshall

Thursday 12/6**Marshall**

Duke staff: Tim Hill, Brad Loveland, Daniel Zakary

GDS staff: Dan Wittliff, Megan Morello

SC ORS staff: none

1. How many and how big are the units are on the site, when were they commissioned, and when did they or will they cease operations? **There are 4 coal units, over 2000 MW total. Not expected to retire any time soon. Currently working on dual fuel conversion.**
2. How many CCR impoundments and landfills are on site, when were they built, and when were they decommissioned or closed? What is their capacity and how much is currently in place? **Active Ash Basin, Industrial Landfill, FGD Landfill, dry CCP Landfill, Photovoltaic structural fill**
3. Please describe how ash and sludge are conveyed to the impoundments or landfills. **Fly ash has been dry handled since the 80s, bottom ash has been dry handled as of last week, was wet previously.**
4. Were landfills lined with a Subtitle D compliant liner when they were built? Please describe the liners currently in place on plant landfills where CCR is stored or disposed of? How far above the uppermost aquifer is the bottom of the liner? **FGD landfill is being closed/capped now, will have a geocomposite cover. One large ash pond, one dam (built when plant was built, before the lake existed). There is a double-lined subtitle D compliant landfill for production ash (scrubber waste, ash, and gypsum) – liner is clay and double lined with geomembrane and geocomposite, also has leachate collection and detection systems. There is a new lined retention basin – has new NPDES outfall. There is also a new lined holding basin – process water and coal pile runoff – infrequently diluted/treated.**
5. Were CCR surface impoundments (ponds) lined when they were built? Have they been lined since? Please describe the liners currently in place on plant surface impoundments where CCR is stored or disposed of? How far above the uppermost aquifer is the bottom of the liner?
6. Please describe any issues that have occurred with seeps, leaks, or slope erosion on surface impoundments. What has been done to control, eliminate, or otherwise mitigate these issues? Were these seeps or leaks permitted under the NPDES program administered by the state? When were these permits issued? Are there any issues with discharge parameters that need treatment such as pH control? Please describe. **Seeps were originally NPDES permitted, now moved to the SOC – SOC gives more representative sampling and allows dispositioning. NPDES permit active 5/1/18, SOC April 2018. On an A.O.W. (area of wetness) sign, “D” means dispositioned, “R” means under review.**
7. Please describe the closure plan and its associated schedule that have been submitted to the state environmental agency for each landfill or impoundment. What factors drove the choice of closure plan options? Please describe the costs associated with the closure plan for the closure action chosen and any other alternative closure options that were considered. **The closure plan is not yet approved by DEQ. Decanting will begin July 2019, given a year to complete. Will cut and fill**

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Exhibit 2.6.2 – December 2018 Site Visit - Marshall

to grade and then cap in place. Routing stormwater pipes around basin instead of into it. Gypsum is sold offsite

8. What issues to ground water drinking supplies have been caused by the seeps and leaks from the surface impoundments or landfills? What has been to address these issues? **Lake Norman is the raw water supply to cities nearby. No groundwater impacts known by staff.**
9. Please describe the process where CCR is generated, conveyed, stored/disposed, or reused? Include the fraction of the CCR that is bottom ash, fly ash, economizer ash, and scrubber sludge and how much of each is stored/disposed or sold or beneficially reused. Where beneficiation exists or is contemplated for a site, please describe the following: (a) the process itself, (b) the rationale for choosing this technology, (c) the rationale for choosing this site, (d) the schedule of completing this project, and (e) the costs/performance associated with project. **Fly ash has been dry handled since the 80s, bottom ash has been dry handled as of last week, was wet previously.**

Dan Wittliff

Exhibit 2.7.1 – January 2018 Site Visit - Riverbend

NOTES ON DEC PLANT VISITS – Riverbend

JANUARY 8-10, 2018

Riverbend – In afternoon of January 9, 2018, received safety briefing and participated in overview discussion of the Secondary and Primary Ash Basins as part of the state-mandated remediation project. The original ash basin was installed in 1957. To get extra storage or disposal capacity, the company installed an intermediate dam and raised the impoundment around the Secondary Ash Basin another 10 feet. Together with the System Owner and other DEC personnel, walked the Primary Dam which separates the Secondary Ash Basin from Mountain Island Lake which is a water supply for the City of Charlotte.

a. Remediation Project – To date, the Company has removed 3.9 million tons of CCR and has about 900,000 more tons to remove. Once all the ash is out, the company will grade the bottom to provide uniform shedding of water, get permission to take the dam down, take the dam down, and plant grass over the entire area. Each area will be sampled for less than 50 percent ash at a rate of 1 sample per 10,000 square feet. The Company is on a trajectory to meet CCR and CAMA closure deadlines.

b. Seeps – All of the 12 seeps are now permitted under NPDES permit. However, with the dewatering of the ash basins, all but two of the seeps are not actively flowing. Monitoring

c. Treatment of Interstitial Wastewater – Now that the bulk water has been removed, the Company is removing interstitial water and storing it in a pair of lined impoundments (EQ-1 and EQ-2) until enough of this water is collected and tested to ensure the most effective treatment of the water with a package water treatment to clarify and treat the water as necessary. Up to June 2016, the company pumped the free or bulk water with continuous monitoring plus weekly gran samples to ensure compliance. As water levels lowered, arsenic became a concern but no exceedances were observed.

d. Outfalls – There are three NPDES permitted other than the seeps identified earlier. Outfall 001 is the old once through cooling, 002 is the Ash Basin discharge, and 002A is the yard sump overflow which has been plugged and abandoned.